with all life, man is under the necessity of growth. There is no such thing as reaching a certain point and from thereon taking it easy. Through growth the urologist will not only increase his ability, but he will expand his plant. From the one-room office and the single table, the young urologist will develop many rooms, increased facilities for treating many patients at the same time. If his vision has included these things, he will have his own well-equipped laboratory, his own Roentgenological department and facilities for developing his plates in his own plant. There will also be one or more properly furnished rest-rooms. A well-furnished surgery where minor operations may be performed. In a word, the finished office will be so complete in every detail that it shall never be necessary to turn outside the office for appliances, for any assistance in the performance of diagnostic technique, or for anything less than a major surgical operation. The advantages of all this concentration being the conservation of time and the satisfaction of having diagnostic procedures under one's own supervision.

As one expands, acquires new equipment and space, he must never delude himself through a false sense of economy into acquiring anything falling below his conception of what is the best obtainable at any cost. And, if one's office is to be an expression of himself, no piece of apparatus will be added, and no technique, laboratory or otherwise, adopted but what he is master of it. This does not mean that one will actually do all the work himself; he will require many assistants.

Perhaps with a man's growth and, consequently, necessary dependence upon others to do many things that the limits of time make it impossible for to do personally, nothing is of more importance to his success than the people he selects to be his assistants.

Your institution is you; it is your expression of what you are, of what you believe, and of what you are capable of performing. In the same sense your assistants must also be but an expression of you. In the work you do, your life's work, your assistants are your brain expanded, your hands and your eyes multiplied. In so far as the conduct of your work is concerned, there can be no room for the expression of individuality on the part of your assistants, and their pride should be that through loyalty and belief in you they sink their identity in you. This applies to your institution and its purpose only, of course, as seems almost unnecessary to say.

As you of yourself do all that you can do each day, as you neglect till to-morrow none of the things that are to be done to-day, then neither can you permit that those who are extensions of yourself violate your convictions by inharmonious thought or action.

You must be a firm and wise administrator. You know what you want and you must require its performance.

But whereas those who assist you are in a sense you, in quite another sense they are individuals. As you desire to advance and get what you want, you must appreciate that those who make possible your larger advances have also the same desire for advance and growth as you have. It is necessary then, and your true success depends upon it, that you provide means whereby those who work with and for you may see before them the open road to a larger share in the rewards of the work of what by now has become an institution.

This, then, comprises all that is necessary to the achievement of success; if some of it is of general application that is none the less a reason why it is not specifically applicable to the specialty of urology, and to attain any degree of conspicuous success no proposal advanced may be safely ignored.

204 Dalziel Bldg.

STIFFNESS IN THE EXTREMITIES FOLLOWED BY ACCIDENT AND INJURY. *

By A. L. FISHER, M. D., San Francisco.

The object of this paper is to attempt to classify some of the causes of stiffness following injuries to and operations on the extremities.

We are all familiar with the fact that after operation or injury stiffness is one of the most disagreeable and trying symptoms that arises. Stiffness may be due to lesions in practically any or all of the structures that go to make up the extremity. The first stiffness of which a patient complains after immobilization of the part, particularly in the lower extremity, is due to oedema —lack of vascular tone and muscular activity. When this is the only cause the condition is temporary and with resumption of muscular activity soon passes off.

In considering the other causes of stiffness, I think it may be well to take certain examples and use them as types. First, bony changes. Apart from the gross deformity following injury the principal cause of stiffness is chronic arthritis with the upbuilding of bone predominating. Take, for example, a fracture about the ankle. The fracture is immobilized and after, say, three months the patient is told he can go to work. The surgeon says three months is a long enough disability for a fracture near the ankle. The man attempts to work but finds he cannot. The ankle is painful, perhaps, and is stiff. He goes about six or eight months, or a year, when finally an X-ray shows the presence of chronic arthritis. Search is then made for the points of origin of focal infection. Usually it is easily discovered in the mouth about the teeth. These are then attended to, but the permanent damage has been done. It seems that injury near a joint predisposes that joint to chronic non-specific arthritis. There is an opportunity here for a lot of investigation—the relation of trauma to the production of chronic arthritis. I would here issue this warning: In the care of injuries in and about the joint, look after the sources of focal infection, especially the teeth, and this should be done immediately and not wait until arthritis develops.

In this same group of chronic arthritis the cartilages are not infrequently, perhaps invariably, affected. They take part in the process and at an earlier stage than the bony change become visible. I recall one man who had, fourteen months after

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injury, (a fracture of the lower third of both bones of the leg), a stiff ankle. X-ray examination showed a thinning of the cartilage, the early stage of chronic arthritis. This man had apical abscesses.

Lesions of the synovial membranes cause stiffness under three conditions: First, acute synovitis with effusion; second, marked villous formation; third, extreme thickening of the membrane itself. These lesions will cause limitation of motion, but in the case of villous formation there will be free motion through its possible range and then sudden stoppage. Thickening of the joint capsule comes under consideration only rarely.

I think the most frequent cause of stiffness after operation and injury is due to change in the muscle. In taking up this subject it will be necessary to consider several types of injury. First let us consider that type of stiffness that we have all observed following fracture of the femur. It is a matter of common knowledge that after these fractures the knee is stiff. Why? Is there any lesion in the knee joint? There is not. Then why does the knee not bend? Let us consider for a moment what happens to the muscle when the bone is fractured. The muscle is lacerated, there is hemorrhage into it, and definite hemotoma may be formed. Following the injury there is a reaction, cellular infiltration and the gradual production of a scar. The scar of itself causes shortening of the muscle, but more important it unites the muscle to the femur, say in its middle third, so that the muscle acts from about the middle third of the thigh only and not through its whole length. In addition to this, the muscle also unites with the surrounding fibrous structures. I have had this question asked me by the head of the Physiotherapy Department of the University of California: "Why is it that the knee is so much stiffer in the broken femur cases that have been operated upon that in those that have not been operated upon?" I think the answer is plain. In the non-operative cases the scar is formed at the site of fracture only. In those cases operated upon the scar extends for a distance of eight, ten, or more, inches, and the muscle becomes adherent to the bone and surrounding facias so much nearer the knee joint and so its active part is so much shorter.

Now consider another type of injury; let's say, for example, a fracture of the clavicle. In this injury the arm is put up in a Sayre or Velpeau dressing. The fracture itself gives no after trouble, but there will be stiffness in the arm, perhaps a little at the shoulder, abduction being difficult, but the main disability, especially in children, is the inability to extend at the elbow. This is due to shortening of the biceps muscle which shortens in response to a definite biological law which states that "whenever the origin and insertion of a muscle approach each other and are held in this position the muscle will shorten." With the arm held in the Velpeau position, the origin and insertion of the biceps approach each other. This law also comes into play where any joint is held still for a length of time, as either the flexors or extensors are held in a permanently shortened state. As will appear later, in most instances, this stiffness is not difficult to overcome.

The third type of muscular lesion is that in which the muscle fibers degenerate and there is substitution of these fibers by fibrous tissue, as in Volkman's Ischaemic contraction. In this condition certain of the muscle fibers die and are replaced by fibrous tissue. Fibrous tissue ordinarily contracts. In this condition it does so; consequently, we have a constant pull on the flexor surface of the forearm, resulting in the characteristic contraction. This condition is not only produced in the classical way, namely, by the removal of tight splints, but may be brought about by falls on the arm. I have seen at least one such instance where a man developed an ischaemic contraction following two falls from a bicycle, in each instance striking the flexor surface of the forearm. An ordinary muscular wry neck is also the same type of lesion.

Adhesions of tendons to scar tissue is a troublesome source of stiffness. The tendons themselves may be but slightly injured, just enough to give a growing surface, but they become embodied in a mass of scar and the muscular pull from above is, of course, interfered with.

Tendon sheath inflammations ordinarily give rise to transitory stiffness unless the inflammation be suppurative when, if left alone or unless skilfully treated, it will destroy the tendon—or unless it be tuberculous. Facial thickening comes into consideration only in special cases, as in Dupuytrens contraction or as a source of pain and consequent stiffness, as in fibrositis.

Nerve injury as a cause of stiffness is interesting. Ordinarily we think of injury or disease of peripheral nerves as causing, not stiffness, but flacidity. If nerves to both flexor and extensor muscles are injured this would be true, but we must take into consideration that ordinarily only one set of nerves is injured or perhaps only one nerve. The muscles with the uninjured nerves go into tonic activity with the result that contraction may and does occur. The nerve may be severed, it may be caught in a scar or callous, or may merely have been crushed. In any case its axis cylinder has been destroyed and the muscle it supplies will not function again until the axis cylinder grows down. The stiffness due to upper neurone lesion, as exemplified by Little's disease, or himeplegia, is due to overaction of the stronger group of muscles; both groups, flexors and extensors, being in tonic activity, direction of motion will, of course, be that of the stronger pull.

You will note that I have not mentioned adhesions in joints. Adhesions in joints do occur but are exceedingly rare. I have opened for various causes a great many joints and I have seen adhesions in but one joint. That was an old gonorrheal knee. The so-called adhesions in joints are, I believe, nothing but slight fibrous thickenings about the joint.

Treatment: In most of the conditions herein enumerated something can be done, in many a good deal, in a few very little. It was really a consideration of what can be done by physiotherapy that interested me at first. Physiotherapy is un-

questionably a fad at present. It is true it can do some things, but it cannot do all. Our physiotherapeutic agents are massage, active and passive motions, either manual or with machine, constant traction, moist and dry heat, electricity, light, and passive hyperaemia. In a few of the conditions above mentioned we have indications for operation.

In bone injuries early passive motion and massage unquestionably help. They produce muscle tone and prevent annoying oedema. In the treatment of arthritis the therapy must be directed against the cause. The other means, heat, massage, passive congestion, etc., may make the patient feel better for an hour or two, but they make no permanent change in the joints themselves.

In the first type of muscle change, that is, scar following fracture, especially in fracture of the femur, perhaps a little can be done by using the force on the leg to bend the knee, but after the first bend is made the patient will do most of the loosening by the use of his own muscles. In the second type, the shortened normal muscle, a great deal can be done by passive motion. The muscle yields readily to stretching. In most instances it takes but a few motions if the opponents are in good condition. I wish to emphasize here the fact that fixation of a normal joint does not cause ankylosis. There is nothing in a normal joint that can cause union between the two bones, no matter how long they be held together. If the joint is the seat of a chronic arthritis, there may be bony interlocking or even bony union. In the third condition, muscle degeneration, constant traction is the only thing that does any good.

To loosen scar tissue in skin or fascia by massage, or any other form of physiotherapy, is, I believe, hopeless. The skin about the scar may be loosened, but not the scar itself. It is hopeless also to attempt to free adherent tendons in this manner. Suppurative tendon sheath infections should be opened by multiple lateral incisions and then the constriction bandage should be applied above the affected part for 20 to 22 hours a day. In the treatment of nerve injuries the essential thing, of course, is to re-establish and maintain a continuity of the nerve. This done and the extremity maintained in its physiologic position all is done that can be done until the nerve grows down. It does no good to massage or electrify a muscle without a nerve. If there is not an actual paralysis, but merely paresis, then massage and electricity may help.

In going over case records and in questioning enthusiastic physiotherapy aids, I have been struck by the fact that physiotherapy as at present applied and, shall I say, misapplied, does good in early fracture cases and practically in this group of cases only. We have all seen enthusiastic attempts to do this, that and the other by means of physiotherapy, but when we sit down and cold-bloodedly study the records, the limitations of this form of treatment become more and more apparent. It is for careful and unbiased observation of results that I would ask.

RECENT DEVELOPMENTS IN RADIUM THERAPY.*

By REX DUNCAN, M. D., Los Angeles.

The past five years have seen great advancement in radium therapy equal to, if not greater than that of any other branch of medicine. This has resulted not so much from our increased knowledge of the physical properties of radium, as from the better application of this knowledge and more particularly from a careful study and better understanding of the histological changes produced in both normal and abnormal tissues.

Improved technique, or I might say, an entirely new technique has developed from the use of radium emanation and has greatly broadened the scope of radium therapy.

While it is my purpose to call attention to the more recent developments in radium therapy, I wish to emphasize the fact that radium is not an agent to be used indiscriminately; each case must be thoroughly and individually studied and radium therapy employed only when alone or in combination with some other form of treatment, results are offered superior to those otherwise obtainable.

Inasmuch as all modern work with radium must necessarily imply the use of radium emanation, I wish briefly to refer more in detail to it.

Radium is an element which owes its therapeutic properties to certain rays emitted during the process of its disintegration. These rays are termed alpha, beta and gamma rays. The first products of its disintegration are helium, an inert gas, and radium emanation to which it owes its radio activity. It is to the changes produced by these rays in the tissues that radium owes its therapeutic value. By means of an apparatus perfected by Prof. Duane of Harvard University, it is possible to collect from a sufficient quantity of radium in solution, the emanation, which may be used for therapeutic purposes, and which has all the properties of the parent substance. Radium emanation, a gas, is capable of great concentration. This permits of having in a very small container several hundred times the activity that might be obtained from a similar bulk of the radium salts. This is of tremendous advantage, where radium is to be applied within cavities or where screened or unscreened tubes are to be buried with the tumor substance.

When a small amount of sodium chloride or a piece of lead foil is encased in a glass tube, properly connected with this apparatus, and the emanation is brought and retained in contact with it for three hours, the active deposits radium B and C, which emit beta and gamma rays, will be deposited thereon, rendering the substance temporarily radio-active. The salt may be dissolved in a proper quantity of water to produce a physiological salt solution, its radio activity measured and administered intravenously. Lead foil, when rendered radio-active, in this manner may be cut into the desired shape for the treatment of various superficial lesions.

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